REMARKS

This Amendment responds to the Office Action dated March 29, 2004 in which the Examiner rejected claims 1-16 under 35 U.S.C. §112, first paragraph, rejected claims 1, 5-7 and 12-16 under 35 U.S.C. §112, second paragraph, and rejected claims 1-2, 4 and 8-12 under 35 U.S.C. §102(b).

Applicants respectfully traverse the Examiner's rejection of claims 1-16 under 35 U.S.C. §112, first paragraph. As indicated above, claim 1 has been amended to correct a typographical error. An elastically deformative insulating material is described in the specification on page 14, lines 17-18, page 15, lines 23-25 and most particularly on page 16, lines 2-20. Applicants respectfully submit that the specification clearly indicates what the elastically deformative insulating material is. Additionally, applicants respectfully point out that the specification provides support for the tips of the probes having a recess or protrusion as discussed in the specification page 19, lines 4-5, page 20, lines 11-26 and page 21, lines 6-11. Furthermore, applicants respectfully bring the Examiner's attention to Figures 3-4. Therefore, applicants respectfully request the Examiner withdraws the rejection to the claims under 35 U.S.C. §112, first paragraph.

As indicated above, claims 2 and 5 have been amended in order to more particularly point out and distinctly claim the electrodes 202a and 202b shown in Figure 6 and claimed in claims 2 and 5. Additionally, applicants respectfully point out that the guiding member is shown in Figure 9 as reference numeral 3. Finally, claims 12-16 have been amended. Therefore, applicants respectfully request the Examiner withdraws the rejection to claims 2, 5-7 and 12-16 under 35 U.S.C. §112, second paragraph.

As indicated above, claim 1 has been amended only for a typographical error.

Claim 1 claims a test socket and claim 12 claims a connecting sheet for a test socket for testing electrical characteristics of a semiconductor device by connecting probes, arranged in a grid-like form, with outer connecting terminals of the semiconductor device, arranged in a grid-like form, and electrically connecting the probes with the outer connecting terminals. The connecting sheet is made of an elastically deformative insulating material, and having electrodes for electrically connecting the probes to the outer connecting terminals of the semiconductor device. A plurality of protrusions, formed into a smooth curved surface, and a plurality of recesses, formed into a smooth curved surface and extending in the vicinity of the protrusions, are formed in the electrodes of the connecting sheet, and are in contact with the outer connecting terminals of the semiconductor device.

Through the structure of the claims invention having a connecting sheet made of an elastically deformative insulating material and having electrodes formed with a plurality of protrusions and a plurality of recesses, as claimed in claims 1 and 12, the claimed invention provides a test socket having sufficient electric contact between the probes and connecting terminals. The prior art does not show, teach or suggest the invention as claimed in claims 1 and 12.

Claim 4 claims a test socket and claim 15 claims a connecting sheet included in a test socket having a circuit board, which transmits an electrical signal for testing electrical characteristics of a semiconductor device to outer connecting terminals of the semiconductor device, arranged in a grid-like form, and receives the electrical signal from the outer connecting terminals, and transmits the electrical signal to a testing equipment and receives the electrical signal from the testing equipment. The

connecting sheet is made of an elastically deformative insulating member and having electrodes for electrically connecting the circuit board with the outer connecting terminals of the semiconductor device. A plurality of protrusions, formed into a smooth curved surface, and a plurality of recesses, formed into a smooth curved surface and extending in the vicinity of the protrusions, are formed in the electrodes of the connecting sheet, and are in contact with the outer connecting terminals of the semiconductor device.

Through the structure of the claimed invention having a connecting sheet made of an elastically deformative insulating material and having electrodes formed with a plurality of protrusions and a plurality of recesses as claimed in claims 4 and 15, the claimed invention provides a test socket having sufficient electric contact between probes and connecting terminals. The prior art does not show, teach or suggest the invention as claimed in claims 4 and 15.

Claims 1-2, 4 and 8-12 were rejected under 35 U.S.C. §102(b) as being anticipated by *Akram et al* (U.S. Patent No. 6,107,109).

Applicants respectfully traverse the Examiner's rejection of the claims under 35 U.S.C. §102(b). The claims have been reviewed in light of the Office Action and for reasons which are set forth below, Applicants respectfully request the Examiner withdraws the rejection to the claims and allows the claims to issue.

Akram et al appears to disclose an interconnect having laser machined contacts for electrically engaging external contacts on semiconductor components such as dice, wafers and chip scale packages. Semiconductor components include external contacts that allow electrical connections to be made from the outside to the integrated circuits contained on the components. A semiconductor die, for example,

includes patterns of bond pads formed on a face of the die. At the wafer level, the bond pads are used for probe testing the integrated circuits on the die. At the die level, the bond pads are used for testing, and also for making electrical connections, such as wire bonds, for packaging. Typically, the bond pads comprise planar aluminum pads, or alternately solder bumps on solder wettable pads. (col. 1, line 8-25) As shown in FIG. 1A, a substrate 10 can be provided. Preferably, the substrate 10 comprises a wafer of material on which multiple interconnects will be fabricated using semiconductor circuit fabrication techniques, and then singulated by cutting the wafer. In the embodiment illustrated in FIGS. 1A-1D, the substrate 10 comprises a semiconductor material such as monocrystalline silicon, germanium, silicon-on-glass, or silicon-on-sapphire. In other embodiments to be subsequently described, the substrate 10 can comprise a ceramic material, or a glass filled resin material, such as FR-4. The substrate 10 includes a face side 14 and an opposing backside 16. The face side 14 and backside 16 of the substrate are planar surfaces generally parallel to one another. The recesses 12 can be etched by forming a mask (not shown) on the substrate 10, such as a photopatterned resist mask, or a hard mask, and then etching the substrate 10 through openings in the mask, using a wet or dry etchant. (col. 4, lines 1-24) In the illustrative embodiment, the external contacts 18 comprise metal bumps on a die, or a chip scale package. The recesses 12 are sized and shaped to retain and electrically engage the external contacts 18 (FIG. 3). (col. 4, lines 40-47) As also shown in FIG. 1A, following formation of the recesses 12, an insulating layer 24 can be formed on the surface of the face side 14 of the substrate 10, and on the surfaces of the recesses 12. At the same time an insulating layer 24B can be formed on the backside 16 of the substrate 10. (col. 5, lines 3-13) The

insulating layer 24 functions to insulate a bulk of the substrate 10 from conductive layers 26 to be subsequently formed on the substrate 10. The insulating layer 24B functions to insulate the bulk of the substrate 10 from components to be subsequently formed on the backside 16 of the substrate 10. Following formation of the insulating layer 24, conductive layers 26 are formed within the recesses 12. Peripheral edges 28 of the conductive layers 26 are adapted to penetrate native oxide layers on the bumped external contacts 18 (FIG. 3) to contact the underlying metal. (col. 5, lines 27-31) Referring to FIG. 1B, following formation of the conductive layers 26, openings 30 can be formed through the conductive layers 26, and through the substrate 10 to the backside 16 thereof. (col. 5, lines 57-60) Following formation of the openings 30, and as shown in FIG. 1C, an additional insulating layer 24A can be formed on the inside surfaces of the openings 30, and on the back side 16 of the substrate. (col. 6, lines 14-17) Following formation of the insulating layer 24A, and as shown in FIG. 1D, conductive members 34 can be formed within the openings 30. (col. 6, lines 24-26) As shown in FIG. 1D, the conductive members 34 are formed within the openings in electrical contact with the conductive layers 26. The conductive members 34 provide straight line electrical paths from the conductive layers 26 to the back side 16 of the substrate 10. (col. 6, lines 48-58) The electrical paths in addition to being direct also are insulated from one another by the insulating layers 24A and by the bulk of the substrate 10. As also shown in FIG. 1D, the conductive members 34 can include pads 36 formed along the back side 16 of the substrate 10. In addition to the pads 36 (or 36B), the conductive members 34 can include contact balls 38 formed on the pads 36 (or 36B). The contact balls 38 can be formed of metal or a conductive polymer. The contact balls

38 provide connection points for making electrical connections from the outside to the conductive members 34 and conductive layers 26. If the contact balls 38 are not provided on the pads 36 (or 36B), the electrical connections from the outside can be made directly to the pads 36 (or 36B). (col. 7, lines 7-15)

Thus, *Akram et al* merely discloses a substrate such as a monocrystalline silicon, germanium, silicon-on-glass, silicon-on-sapphire, a ceramic material or a glass filled resin material. Nothing in *Akram et al* shows, teaches or suggests a connecting sheet made of an elastically deformative insulating material as claimed in claims 1, 4, 12 and 15. Rather, *Akram et al* merely discloses a wafer formed from a plurality of semiconductor materials.

Additionally, *Akram et al* merely discloses a contact 32 including conductive layer 26, conductive member 34, pad 36, contact ball 38 and including a recess 12 and an edge 28. Nothing in *Akram et al* shows, teaches or suggests that the electrodes includes a plurality of protrusions and a plurality of recesses as claimed in claims 1, 4, 12 and 15. Rather, *Akram et al* merely discloses that each contact 34 includes a single recess 12 having a conductive layer 26 with edges 28.

Since nothing in *Akram et al* shows, teaches or suggests a) a connecting sheet made of an elastically deformative insulating material and b) the electrode includes a plurality of protrusions and a plurality of recesses as claimed in claims 1, 4, 12 and 15, applicants respectfully request the Examiner withdraws the rejection to claims 1, 4, 12 and 15 under 35 U.S.C. §102(b).

Claims 2, 8-11, 13-14 and 16 depend from claims 1 and 4 and recite additional features. Applicants respectfully submit that claims 2, 8-11, 13-14 and 16 would not have been anticipated by *Akram et al* within the meaning of 35 U.S.C.

§102(b) at least for the reasons as set forth above. Therefore, applicants respectfully request the Examiner withdraws the rejection to claims 2, 8-11, 13-14 and 16 under 35 U.S.C. §102(b).

The prior art of record, which is not relied upon, is acknowledged. The references taken singularly or in combination do not anticipate or make obvious the claimed invention.

Thus it now appears that the application is in condition for reconsideration and allowance. Reconsideration and allowance at an early date are respectfully requested.

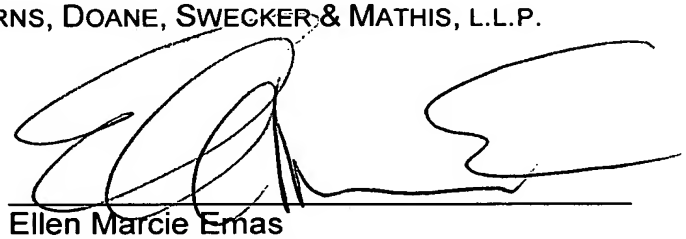
If for any reason the Examiner feels that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed within the currently set shortened statutory period, applicant respectfully petitions for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

In the event that any additional fees are due with this paper, please charge our Deposit Account No. 02-4800.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.



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By: _____
Ellen Marcie Emas
Registration No. 32,131

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620